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Nuclear power – the road to net zero?

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► Debate resurfaces in Malaysia as country plans to explore option amid growing energy demand and transition to low-carbon future

PETALING JAYA: The global momentum for nuclear energy is gaining pace as countries race to meet their net-zero targets and secure energy independence through low-carbon solutions – and Asean nations, including Malaysia, are no exception.

In Malaysia, debate over whether to include nuclear power in the national energy mix has resurfaced as the government seeks to balance its 2050 net-zero ambition with the country's growing energy demands.

Malaysia's push to become a regional data centre hub is expected to significantly increase electricity consumption.

According to energy think tank Ember, power demand from data centres is projected to surge sevenfold – from 8.5 terawatt hours (TWh) in 2024 to 68 TWh in 2030 – accounting for about 30% of total national demand.

The key question is how Malaysia will meet these rising energy needs.

Deputy Prime Minister Datuk Seri Fadillah Yusof, who also heads the Energy Transition and Water Transformation Ministry (Petra) recently said the government plans to explore nuclear energy for power generation under the 13th Malaysia Plan as part of its clean energy strategy.

The initiative will be coordinated by the Nuclear Energy Programme Implementing Organisation (Nepio) under MyPower Corporation, based on guidelines from the International Atomic Energy Agency (IAEA).

Proponents argue that nuclear energy provides a reliable, large-scale, low-carbon power source essential for supporting Malaysia's economic growth and achieving its 2050 net-zero emissions goal.

At the United Nations Climate Change Conference held in Dubai, United Arab Emirates, from Nov 30 to Dec 12, 2023, more than 20 countries pledged to triple global nuclear capacity by 2050, highlighting its rising significance in the global energy transition.

However, as Malaysia awaits detailed implementation guidelines, debate continues to intensify between supporters – who view nuclear power as vital for decarbonisation – and critics

who cite concerns over waste management, safety, and cost.

The nuclear debate gained new traction during the World Atomic Week 2025, held on Sept 25–28 in Moscow.

The event, organised by Rosatom State Atomic Energy Corporation, marked the 80th anniversary of Russia's nuclear industry and gathered industry leaders, policymakers, scientists, and media from more than 100 countries under the theme "Everything Starts with an Atom."

World Nuclear Association (WNA) director-general Dr Sama Bilbao y Leon said nuclear energy could reduce electricity costs by as much as 75% once integrated into national grids.

While acknowledging the high upfront investment, she stressed that the long-term economic and social benefits far outweigh initial costs.

"Although nuclear power plants require large capital, they provide 24/7, carbon-free, and highly reliable electricity and heat for 60, 80, or even 100 years," she told the international press on the sidelines of the event.

She urged governments to consider the full economic picture rather than focusing only on construction costs.

"When assessing nuclear economics, we must account for decades of clean energy generation, job creation, and socio-economic growth," she said.

Citing Finland's experience – where electricity prices dropped by 75% after introducing nuclear energy – she said countries like Malaysia should evaluate not just the investment, but the long-term national benefits.

(The Olkiluoto plant, which began commercial operation in 2023, now provides about one-third of Finland's electricity.)

IAEA director-general Rafael Grossi added that nuclear power had shed the "unjustified reluctance and doubts" of past decades, and is now recognised as a safe, reliable energy source.

"There will be no risks in terms of proliferation or safety, and it will facilitate access for developing countries," he said.

Several Asean nations are already moving ahead. The Philippines aims to develop up to 4,800MW of nuclear power by 2050, Vietnam has reintroduced nuclear into its power plan, and Indonesia is exploring small modular and floating reactors by 2030. Thailand and Myanmar have signed cooperation agreements with Russia and Rosatom to study SMRs.

Asean Centre for Energy executive director Datuk Razib Dawood said the region must urgently strengthen clean energy capacity – including nuclear – to meet the rising power demand from data centres and artificial intelligence (AI) infrastructure.

"The demand from AI, cloud computing, and data centres is immense, not only for processing but for cooling systems that run 24/7. We cannot ignore this when planning our future energy mix," he told Bernama.

Razib, the former Energy Commission (ST) CEO, said renewable energy remains central to Asean's transition but is intermittent. Thus, countries need other reliable, low-carbon options such as nuclear.

"Tech giants like Google and Amazon already recognise nuclear as a clean, stable energy source. To attract digital investments and maintain competitiveness, Asean nations must ensure secure and predictable power," he said.

Concerns over nuclear waste and radiation safety remain major public hurdles – often linked to memories of the 2011 Fukushima Daiichi disaster in Japan.

On March 11, 2011, a major nuclear accident took place at the Fukushima Daiichi Nuclear Power Plant in Okuma, Fukushima, Japan, triggered by the Tōhoku earthquake and tsunami, which caused a complete failure of the electrical grid and severely damaged nearly all of the plant's backup power systems.

WNA's Bilbao said the nuclear industry has effectively managed waste using a closed-cycle system.

"No other energy source can claim that every gramme of waste produced globally in the past 80 years is properly managed – either stored, or safely isolated from the environment," she said.

She advised newcomer countries like Malaysia to adopt clear waste management strategies to strengthen public confidence.

Razib echoed the need for transparency and strong regulation before Malaysia proceeds.

Vitaliy Pakermanov, acting director SMR Project Office of Rosatom's Mechanical Engineering Division, said the company has a comprehensive waste management master plan to support reactors with service lives of 40 to 60 years.

"Safety is our priority, and Rosatom provides support and management of NPP during the whole lifecycle including decommissioning and radioactive waste management," he said.

To strengthen public understanding and confidence, Malaysia Programme Office for Power Electricity Reform (MyPOWER) Corporation – which serves as Malaysia's Nepio – has outlined a phased communication strategy.

Its CEO Asdirhyme Abdul Rasib said the short-term plan, spanning the next 12 months, will focus on public engagement and energy

literacy campaigns highlighting the everyday applications of technology.

"We want to show that nuclear technology and application is already part of our daily lives – through medical radiation such as X-rays, materials testing, and research, which are safe, familiar applications that help the public relate better to nuclear science," he told Bernama at the Asean Business and Energy Ministers Meeting 2025 forum at the Kuala Lumpur Convention Centre recently.

The programmes will be carried out under the Malaysia Energy Literacy Programme in collaboration with PETRA and the Energy Commission, targeting schools, universities and community groups.

Building on this foundation, the next stage – a 10-year strategic communication plan, will focus on long-term stakeholders' engagement, particularly in areas that could be identified as potential nuclear development sites in the future.

Asdirhyme said the government has demonstrated strong commitment by allocating about RM28.6 million in Budget 2026 to advance Malaysia's nuclear readiness, in line with the need to decarbonise the electricity sector while meeting growing energy demand.

He said for the purpose, six national task forces comprising multiple ministries and agencies – led by Petra and the Ministry of Science, Technology, and Innovation – have also been established to support nuclear development efforts, including technical and regulatory oversight.

He said MyPOWER is also conducting a detailed assessment on Malaysia's legal and regulatory frameworks to ensure full compliance international legal requirements under the IAEA guideline.

Asean Parliamentarians for Human Rights co-chairperson Charles Santiago urged the government to disclose proposed reactor and waste disposal sites, saying transparency is key to public trust.

He also called for the release of a full cost-benefit analysis, including decommissioning and long-term waste management costs.

Sahabat Alam Malaysia president Meenakshi Raman raised similar concerns, questioning where nuclear waste would be stored given its long-lasting radioactivity.

"Radioactive materials such as uranium and thorium can remain hazardous for thousands of years. How will we ensure safety for future generations?" she asked.

Recalling the 1982 Bukit Merah radioactive pollution incident in Perak, once described as Asia's worst radioactive contamination case, she said Malaysia must not repeat past mistakes.